The Incredible Bulk

Can that corn husk you threw away someday power your car?

Abstract: Biomass fuels (fuels made from plants) could provide an energy source that replaces fossil fuels with a cheap and environmentally benign alternative.

Los Alamos National Laboratory researchers, working with other American, Japanese, and European scientists, have discovered that the tough walls of normally inedible plants can be dissolved into a simple sugar that can power vehicles, or fuel power plants.

Los Alamos -- or The Hill, as locals refer to the Department of Energy facility on Northern New Mexico's Pajarito Plateau – is home to much groundbreaking science. This recent discovery on the Hill paints a picture akin to moonshiners on another hill fermenting corn in a still to convert the sugar into alcohol for a hillbilly happy hour. This Los Alamos project, however, focuses on weaknesses in thin sheets of cellulose molecules that make up the tough outer wall of lignocellulosic biomass, the inedible fibrous material derived from plant cell walls.

This incredibly tough exterior is a potentially abundant source of sugar that can be used to brew batches of ethanol, that colorless flammable liquid used to make antifreeze, or butanol, which is derived from the common household fuel butane.

The researchers from Los Alamos, led by Paul Langan and collaborating with the U.S. Department of Agriculture, University of Tokyo, and the *Centre de Recherches sur les Macromolecules Vegetables* in France, recently published their research in the *Biophysics Journal* and *Journal of Biomacromolecules.*

Langan and his partners blasted neutrons, subatomic particles with no electrical charge, into the crystalline structure of plant cellulose, and measured their reflection. The precision process, like an X-ray probing the structures of the body, revealed that the cellulose layers plants can be broken down into sugars for biofuel.

Biomass fuels have been around since cavemen burned wood for heat, but the modern version being researched by Langan and his colleagues could provide an alternative energy source that replaces the dependence on fossil fuels with a cheap and environmentally benign alternative.

Funding for Langan's research comes from the Laboratory-Directed Research and Development fund at Los Alamos, which invests in basic science projects involving high-risk, but often high payoff.